

section. Permitted variations are as follows:

(1) Inner packagings of equivalent or smaller size may be used provided—

(i) The inner packagings are of similar design to the tested inner packagings (*i.e.*, shape—round, rectangular, etc.);

(ii) The material of construction of the inner packagings (glass, plastic, metal, etc.) offers resistance to impact and stacking forces equal to or greater than that of the originally tested inner packaging;

(iii) The inner packagings have the same or smaller openings and the closure is of similar design (*e.g.*, screw cap, friction lid, etc.);

(iv) Sufficient additional cushioning material is used to take up void spaces and to prevent significant movement of the inner packagings;

(v) Inner packagings are oriented within the outer packaging in the same manner as in the tested package; and

(vi) The gross mass of the package does not exceed that originally tested.

(2) A lesser number of the tested inner packagings, or of the alternative types of inner packagings identified in paragraph (g)(1) of this section, may be used provided sufficient cushioning is added to fill void space(s) and to prevent significant movement of the inner packagings.

(h) *Proof of compliance.* In addition to the periodic design requalification testing intervals specified in paragraph (e) of this section, the Associate Administrator, or a designated representative, may at any time require demonstration of compliance by a manufacturer, through testing in accordance with this subpart, to ensure packagings meet the requirements of this subpart. As required by the Associate Administrator, or a designated representative, the manufacturer must either:

(1) Conduct performance tests or have tests conducted by an independent testing facility, in accordance with this subpart; or

(2) Make a sample Large Packaging available to the Associate Administrator, or a designated representative, for testing in accordance with this subpart.

(i) *Record retention.* Following each design qualification test and each peri-

odic retest on a Large Packaging, a test report must be prepared. The test report must be maintained at each location where the Large Packaging is manufactured and each location where the design qualification tests are conducted, for as long as the Large Packaging is produced and for at least two years thereafter, and at each location where the periodic retests are conducted until such tests are successfully performed again and a new test report produced. In addition, a copy of the test report must be maintained by a person certifying compliance with this part. The test report must be made available to a user of a Large Packaging or a representative of the Department upon request. The test report, at a minimum, must contain the following information:

(1) Name and address of test facility;

(2) Name and address of applicant (where appropriate);

(3) A unique test report identification;

(4) Date of the test report;

(5) Manufacturer of the packaging;

(6) Description of the packaging design type (*e.g.*, dimensions, materials, closures, thickness, etc.), including methods of manufacture (*e.g.*, blow molding) and which may include drawing(s) and/or photograph(s);

(7) Maximum capacity;

(8) Characteristics of test contents, *e.g.*, viscosity and relative density for liquids and particle size for solids;

(9) Mathematical calculations performed to conduct and document testing (for example, drop height, test capacity, outage requirements, etc.);

(10) Test descriptions and results; and

(11) Signature with the name and title of signatory.

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§ 178.960 Preparation of Large Packagings for testing.

(a) Except as otherwise provided in this subchapter, each Large Packaging and package must be closed in preparation for testing and tests must be carried out in the same manner as if prepared for transportation, including inner packagings. All closures must be installed using proper techniques and torques.

(b) For the drop and stacking test, inner receptacles must be filled to not less than 95 percent of maximum capacity (see § 171.8 of this subchapter) in the case of solids and not less than 98 percent of maximum in the case of liquids. Bags must be filled to the maximum mass at which they may be used. For Large Packagings where the inner packagings are designed to carry liquids and solids, separate testing is required for both liquid and solid contents. The material to be transported in the packagings may be replaced by a non-hazardous material, except for chemical compatibility testing or where this would invalidate the results of the tests.

(c) If the material to be transported is replaced for test purposes by a non-hazardous material, the material used must be of the same or higher specific gravity as the material to be carried, and its other physical properties (grain, size, viscosity) which might influence the results of the required tests must correspond as closely as possible to those of the hazardous material to be transported. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass, so long as they do not affect the test results.

(d) Paper or fiberboard Large Packagings must be conditioned for at least 24 hours immediately prior to testing in an atmosphere maintained—

(1) At 50 percent \pm 2 percent relative humidity, and at a temperature of $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($73^{\circ}\text{F} \pm 4^{\circ}\text{F}$). Average values should fall within these limits. Short-term fluctuations and measurement limitations may cause individual measurements to vary by up to \pm 5 percent relative humidity without significant impairment of test reproducibility;

(2) At 65 percent \pm 2 percent relative humidity, and at a temperature of $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($68^{\circ}\text{F} \pm 4^{\circ}\text{F}$), or $27^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($81^{\circ}\text{F} \pm 4^{\circ}\text{F}$). Average values should fall within these limits. Short-term fluctuations and measurement limitations may cause individual measurements to vary by up to \pm 5 percent relative humidity without significant impairment of test reproducibility; or

(3) For testing at periodic intervals only (*i.e.*, other than initial design

qualification testing), at ambient conditions.

§ 178.965 Drop test.

(a) *General.* The drop test must be conducted for the qualification of all Large Packaging design types and performed periodically as specified in § 178.955(e) of this subpart.

(b) *Special preparation for the drop test.* Large Packagings must be filled in accordance with § 178.960.

(c) *Conditioning.* Rigid plastic Large Packagings and Large Packagings with plastic inner receptacles must be conditioned for testing by reducing the temperature of the packaging and its contents to -18°C (0°F) or lower. Test liquids must be kept in the liquid state, if necessary, by the addition of anti-freeze. Water/anti-freeze solutions with a minimum specific gravity of 0.95 for testing at -18°C (0°F) or lower are considered acceptable test liquids, and may be considered equivalent to water for test purposes. Large Packagings conditioned in this way are not required to be conditioned in accordance with § 178.960(d).

(d) *Test method.* (1) Samples of all Large Packaging design types must be dropped onto a rigid, non-resilient, smooth, flat and horizontal surface. The point of impact must be the most vulnerable part of the base of the Large Packaging being tested. Following the drop, the Large Packaging must be restored to the upright position for observation.

(2) Large Packaging design types with a capacity of 0.45 cubic meters (15.9 cubic feet) or less must be subject to an additional drop test.

(e) *Drop height.* (1) For all Large Packagings, drop heights are specified as follows:

(i) Packing group I: 1.8 m (5.9 feet)

(ii) Packing group II: 1.2 m (3.9 feet)

(iii) Packing group III: 0.8 m (2.6 feet)

(2) Drop tests are to be performed with the solid or liquid to be transported or with a non-hazardous material having essentially the same physical characteristics.

(3) The specific gravity and viscosity of a substituted non-hazardous material used in the drop test for liquids must be similar to the hazardous material intended for transportation. Water